

## **Requirements specification for business process: “Students writing matura exam and receiving score”**

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### **Business goals of the organization**

“High School II” is a high school located in Gdansk. It is a prestigious institution known for its main focus is educating students in mathematics.

There are profile classes: medical with extended biology and chemistry, science with extended mathematics and physics, economics with extended mathematics and geography, law with extended Polish and history.

Every class can contain at most 30 students.

There are many teachers with different teaching methods and years of experience.

### **GOALS (KPI's):**

- 1. Achieving a higher average of results from the extended matura exam by 2 percentage points every year, in comparison with previous years, until reaching the 90% threshold and then maintaining it.**
  - 2. Passing rate of 100% of the basic math matura exam every year.**
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### **Business processes**

#### **First Business Process:**

#### **Students writing matura exam and receiving score**

The process is as follows: Students are coming to school on the days of the matura exams, they are signed up to specific classrooms with different numbers of people in them where they are going to write the exam. They enter the class after the teacher reads their name. They are randomly assigned to spots in the classroom. In each classroom there is one teacher present who is going to supervise the students during the exam. At a certain hour everyone starts to write their exams. After finishing writing, they leave the classroom and can go home.

Two months after writing the exams, students get their results. At the same time, the school will also receive results from the exams of each student.

**Typical questions:**

1. What was the average score for the extended math matura exam last year?
2. Compare the student's results from basic English matura in different profile classes (medical, science, economics, law) from .
3. Is there an increasing trend in the extended math exam scores in the last 4 years?
4. Is there a person who scored 100% from all basic maturas in the last 4 years?
5. What are top 10 scores from the basic math matura from students from law class last year?

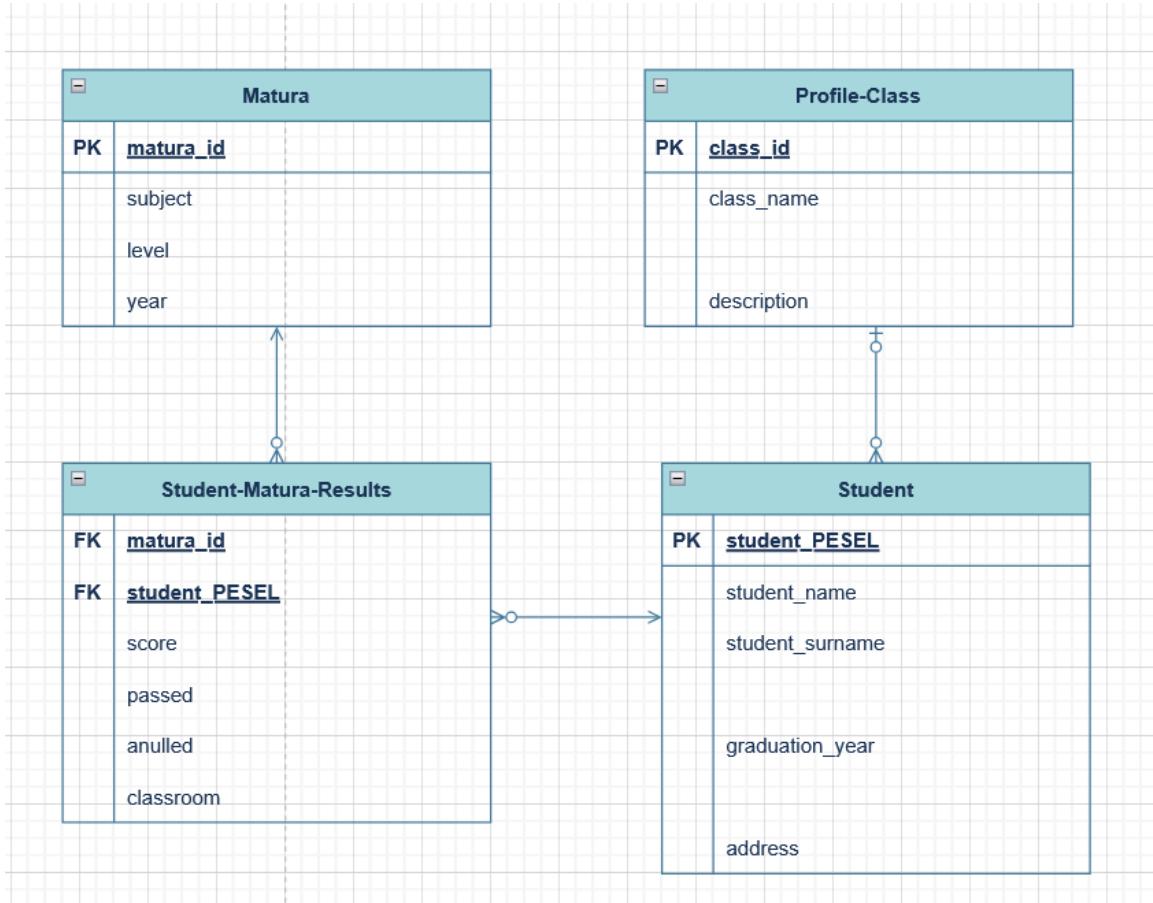
**Data sources:**

- Database with information of teachers supervising during matura exam, students who participated in exam, classes, subjects and results from matura exam
- Excel sheet with the information of the classrooms used for conducting matura exam and students and teachers assignment to the classrooms during each matura exam

## **2. Data Sources**

### **Relational Database (SQL)**

Database stores the information about students, which class-profile they are from, matura exams that were taken by the students and results from them.



| TABLE NAME  | ATTRIBUTE   | ATTRIBUTE TYPE | DESCRIPTION   |
|---|-------------|----------------|---|
| <b>PROFILE-CLASS</b><br>stores data about different profiles of classes in our school | class_id    | INT UNIQUE     | Unique identifier for a class (Primary Key)                                       |
|   | class_name  | ENUM           | Name of the class, one of the following: "medical", "science", "economics", "law" |
|   | description | TEXT           | Additional information about the class  |
| <b>MATURA</b><br>stores information about matura exam                                 | matura_id   | INT UNIQUE     | Unique identifier for an exam (Primary Key)                                       |
|   | subject     | VARCHAR (50)   | Subject of the exam   |

|  |                 |                                  |   |
|--|-----------------|----------------------------------|---|
| <b>STUDENT-MATURA<br/>-RESULT</b><br><b>information about the result<br/>of each matura for each<br/>student</b> | level           | ENUM<br>('basic',<br>'extended') | Type of exam                                    |
|  | year            | YEAR                             | The year the exam took place                    |
|  | student_PESEL   | VARCHAR<br>(11)<br>UNIQUE        | Foreign key referencing Student<br>(student_id) |
|  | matura_id       | INT UNIQUE                       | Foreign key referencing<br>Matura(matura_id)    |
|  | score           | TINY INT                         | Exam score in percentages as integer            |
|  | passed          | BOOLEAN                          | TRUE (pass) / FALSE (fail)                      |
| <b>STUDENT</b><br><b>information about student</b>   | annulled        | BOOLEAN                          | TRUE(yes)/FALSE(no)                             |
|  | PESEL           | VARCHAR<br>(11)<br>UNIQUE        | Unique personal identification number           |
|  | student_name    | VARCHAR<br>(50)                  | Student's first name                            |
|  | student_surname | VARCHAR<br>(50)                  | Student's last name                             |
|  | class_id        | INT                              | Foreign key referencing Class(class_id)         |
|  | graduation_year | YEAR                             | The year the student graduates                  |
|  | address         | TEXT                             | Student's residential address                   |

### Excel Sheet:

Sheet 1 (Exam Schedule and Attendance, each line represents one student attending an exam in a specific classroom, line 1 is a header row):

- **Column A** – Exam Name (text): The name of the exam being conducted.
- Column B - Exam Level
- **Column C** – Classroom (text): The classroom where the exam is held. Some exams may take place in multiple classrooms.
- **Column D** - Size (text): Size of the classroom where the exam is held.
- **Column E** – Supervised Teacher (numeric, unique): PESEL of the teacher supervising the exam in that specific classroom.
- **Column F** - Teacher subject name (text): Name of subject taught by the teacher supervising the exam
- **Column G** – Student Name (numeric, unique): PESEL of the student attending the exam in the specified classroom.

### 3. Scenarios of analytical problem

**Why was there a decrease in the matura results in the last academic year?**

1. Examine the trends in the number of students by the chosen level of matura exams across the last 4 years.
2. Compare the results of students retaking the matura exam last year with the previous 3 years.
3. Compare the average results of the students who wrote exams in smaller classrooms (up to 15 people) and big classrooms (16-40 people) in the last year.
4. Compare the results from the matura exam from last year to the previous 3 years.
5. Compare the results from extended matura exams subjects from students who were in a particular profiled class vs those who took the extended exam from the subject that was not extended in their class.
6. In how many small classes the matura exams were held last year compared to the previous 3 years?

7. Compare the last year average matura results of our school to the national average results .
  8. Was the level of stress influencing the results of the matura exam last year?
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**Why was there an increase/decrease in the number of students writing the extended math exam last year?**

1. How many people were writing other than extended math, extended maturas last year?
2. How many people were writing extended math matura exams from certain profile classes last year?
3. How many people were retaking the extended math matura exam last year compared to two years ago?
4. How many students were absent on an exam last year?
5. Was there a classroom in which the matura was annulled 2 years ago?

## **4. Data needed for analytical problems**

**Why was there a decrease in the matura results in the last academic year?**

- 1. Examine the trends in the number of students by the chosen level of matura exams across the last 4 years.**
  - a. DB table - MATURA: year, level
  - b. DB table - STUDENT-MATURA-RESULT: student\_PESEL
  - c. DB table - STUDENT: graduation\_year
- 2. Compare the results of students retaking the matura exam last year with the previous 3 years.**
  - a. DB table -MATURA: year, matura\_id
  - b. DB table - STUDENT-MATURA-RESULT: student\_PESEL, score
  - c. DB table - STUDENT: graduation\_year
- 3. Compare the average results of the students who wrote exams in smaller classrooms (up to 15 people) and big classrooms (16-40 people) in the last year.**
  - a. Excel Sheet 1: Column B Classroom, Column E Student Name

- b. DB table - STUDENT-MATURA-RESULT: score
- 4. Compare the results from the matura exam from last year to the previous 3 years.**
- a. DB table - MATURA: year, matura\_id
  - b. DB table - STUDENT-MATURA-RESULT: score
- 5. Compare the results from extended matura exams subjects from students who were in a particular profiled class vs those who took the extended exam from the subject that was not extended in their class.**
- a. DB table - MATURA: subject, level, year
  - b. DB table - STUDENT-MATURA-RESULT: student\_PESEL, score
  - c. DB table - STUDENT: class\_id
  - d. DD table - PROFILE-CLASS: class\_id, class\_name
- 6. In how many small classes the matura exams were held last year compared to the previous 3 years?**
- a. Excel Sheet 1: Column B Classroom, Column E Student Name
  - b. DB tabel - MATURA: year
- 7. Compare the last year average matura results of our school to the national average results .**
- a. DB tabel - MATURA: year, matura\_id
  - b. DB tabel - STUDENT-MATURA-RESULT: score
  - c. external source - National Average Results with whole country average scores for different matura exams
- 8. Was the level of stress influencing the results of the matura exam last year?**
- a. DB tabel - MATURA: year, matura\_id
  - b. DB tabel - STUDENT-MATURA-RESULT: score
  - c. external source changing business process Survey: Name of the matura exam, Stress level before the exam

To answer question number 8 we need more data about the stress level of students. That's why we are thinking about conducting an anonymous survey about how students felt before and during the exam. This will change our business process and propose a need for an external source. The survey would have 2 questions:

1. How was your stress level before the exam?  
choose number from 1 (no stress) - 5 (very stressed)
2. Please check the box with the name of matura exam you just wrote:  
there will be three columns - one for most common basic matura exam, second for most common extended matura exam, third one named "other" where one can write the level and name of exam that were not mentioned

Later, teachers would be filling up the excel sheet with the students answers, the excel sheet would look like this:

Column A - Name of the matura exam (text)

Column B - Stress level before the exam (numeric, from 1 to 5)

## **Why was there an increase/decrease in the number of students writing the extended math exam last year?**

- 1. How many people were writing other extended maturas last year?**
  - a. DB table - MATURA: subject, level, year
  - b. DB table - STUDENT-MATURA-RESULT: student\_PESEL
- 2. How many people were writing extended math matura exams from certain profile classes last year?**
  - a. DB table - MATURA: subject, level, year
  - b. DB table - STUDENT-MATURA-RESULT: student\_PESEL
  - c. DB table - STUDENT: class\_id
  - d. DB table - PROFILE-CLASS: class\_id
- 3. How many people were retaking the extended math matura exam last year compared to two years ago?**
  - a. DB table: MATURA: subject, level, year
  - b. DB table: STUDENT-MATURA-RESULT: student\_PESEL
- 4. How many students were absent on an exam last year?**
  - a. Excel: Column A Exam Name, Column E Student Name
  - b. DB table: STUDENT-MATURA-RESULT: student\_PESEL
- 5. Was there a classroom in which the matura was annulled 2 years ago?**
  - a. Excel: Column B Classroom
  - b. DB table: STUDENT-MATURA-RESULT: anulled (check if "yes")